PLANT PROTECTION BULLETIN

A Publication of the
WORLD REPORTING SERVICE ON PLANT DISEASES AND PESTS

VOL. VI, N° 8 MAY 1958

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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
ROME

COMMONWEALTH MYCOLOGICAL
7 JUL 1958

FAO PLANT PROTECTION BULLETIN

is issued as a medium for the dissemination of information received by the World Reporting Service on Plant Diseases and Pests, established in accordance with the provisions of the International Plant Protection Convention, 1951. It publishes reports on the occurrence, outbreak and control of pests and diseases of plants and plant products of economic significance and related topics, with special reference to current information. No responsibility is assumed by FAO for opinions and viewpoints expressed in the Bulletin.

Manuscripts for publication, or correspondence regarding the World Reporting Service, should be addressed to Dr. Lee Ling, Plant Production Branch, Agriculture Division, FAO, Viale delle Terme di Caracalla, Rome, Italy; subscriptions and other business correspondence to the Distribution and Sales Section, FAO, Viale delle Terme di Caracalla, Rome, Italy.

The Bulletin is issued monthly in English, French, and Spanish, and twelve numbers, commencing with the October issue in each year, constitute a volume. Subscription rates are $3.00 or 15s. per annum; single numbers are priced at $0.30 or 1s. 6d. The citation is FAO Plant Protection Bulletin, or, in abbreviation, FAO Plant Prot. Bull.

MAN AND HUNGER

This pamphlet is mainly intended for teachers in secondary schools. It is hoped that it will help stimulate teachers' interest in the world problem of food and the work of the Food and Agriculture Organization. It is also hoped that it will supply teachers with useful data for the presentation of these subjects in the classroom. FAO, like the United Nations and the other Specialized Agencies, is becoming increasingly convinced that the public understanding necessary for the accomplishment of its tasks must start in the schools. This pamphlet, issued in co-operation with Unesco, is an outcome of that understanding. Criticisms, comments and suggestions are welcomed from all users. $0.25 or 1s.3d.

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The first issue in the same series *Nutrition and Society*, consisting of a lecture given by the late Professor André Mayer of France to inaugurate a course for nutrition workers at Marseilles in late 1955, a short biography of Professor Mayer and an account of FAO's work in the nutrition field, is still available from FAO Sales Agents or from Headquarters. $0.25 or 1s.3d.

FAO Plant Protection Bulletin

Vol. VI, No. 8 A Publication of the May 1958

World Reporting Service on Plant Diseases and Pests

Highlights of Insect Conditions in the United States, 1957[1]

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Cereal and Forage Insects

THE European corn borer, *Pyrausta nubilalis* (Hbn.), destroyed approximately 181 million bushels of grain corn worth U.S. $158,841,000 in 1957, according to a fall abundance survey in 21 major corn-producing states. The heaviest loss in a single state was in Iowa, where an estimated 102 million bushels were destroyed. For the United States as a whole, the average number of borers per 100 plants rose from 112 in 1956 to 170 in 1957. Populations did not reach expected levels in several Eastern States but in the North Central States infestations were unusually high in many instances. They reached the highest peak in South Dakota since 1954 and, in Nebraska and Kansas, losses were four times as great as in 1956. Controls were applied on an estimated 116,167 acres in Minnesota and 165,408 in Illinois. The borer continued to spread southward in 1957 with the most significant new occurrence in seven northeast parishes of Louisiana. Greatest abundance in the 1958 season is expected in southeast South Dakota, northeast Nebraska, northwest Iowa and northwest Missouri.

Grasshopper (Acrididae) outbreaks were the most severe and widespread in Nebraska and North Dakota since the 1930s. Activity in Washington and Idaho was considerably above that of 1956 and infestations in Montana were considered the major insect problem of the year. Moderate to severe damage occurred in areas of South Dakota and Kansas. Principal cropland species involved were *Melanoplus bilituratus* (Wlk.), *M. bivittatus* (Say) and *M. femur-rubrum* (Deg.). In the fall, heavy flights of the former species caused extensive damage to wheat in western Kansas, northwestern Oklahoma and eastern Colorado. Collective figures on range and cropland grasshopper control in various midwestern and western states in 1957 were reported as follows: Five States had a total loss of almost $ 4,446,350; ten reported treatment on almost 7 million acres; and nine reported a saving of over $ 71,000,000 through controls. Spring rains in 1957 reduced the rangeland grasshopper threat in much of the southwest; however, insecticides were applied against the pests on more than 1.5 million acres in 11 Western States under the State-Federal co-operative program. Adult surveys in the fall of 1957 showed infestations of economic importance on 18,700,000 acres of rangeland in 16 Midwestern and Western States.

Corn earworm, *Heliothis zea* (Boddie), as usual was widespread and damaging in corn. New Jersey reported the most damage in recent years, Alabama estimated $ 1,120,270 loss on field and sweet corn; Georgia estimated weight loss of 3.9 percent in southern areas and Florida had $ 1,200,000 loss. In addition to corn, pods of soybeans were heavily damaged late in the season in Virginia, Maryland and Delaware. Severe damage was recorded on grain sorghum in areas of Texas. Chinch bug, *Blissus leucopterus* (Say), did not occur in serious outbreaks on corn

[1] This summary has been compiled from co-operative economic insect reports received in the Plant Pest Control Division from state, federal and private sources. Observations on forest insect activity have not been included.

or small grains in 1957. There was local crop loss in some states, especially Kansas, where controls were applied on 414,730 acres for a saving of $1,484,000. The southern subspecies, *B. leucopterus insularis* Barb., which occurs primarily on St. Augustine grass lawns, was a serious problem in some areas. It was rated the number one insect pest in Florida, causing an estimated $23,500,000 loss. Extensive damage also occurred on lawns in southern and central Alabama and coastal areas of Mississippi. Outbreaks of armyworm, *Pseudaletia unipuncta* (Haw.) were the most severe in central and north Texas and Oklahoma, where heavy rainfall occurred during the spring. Counts averaged 5 to 8 per square foot in the Texas areas and there was considerable damage to small grains. The Oklahoma infestations required widespread controls.

Destructive outbreaks of fall armyworm, *Laphygma frugiperda* (J. E. Smith), appeared in many states on corn, sorghum and other crops in 1957. Some fields of corn were almost completely destroyed in Alabama where the loss of corn, peanuts, sorghum and other crops was estimated at $451,600. The pest caused far greater loss in corn yields in Kansas than either corn earworm or European corn borer. Ear-drop ranged from 4 to 30 percent in north central and northeast areas. Late corn was severely damaged in a number of Midwestern and Southern States. Many fields were 100 percent infested in Arkansas and Colorado. The Arkansas infestations were the heaviest and most extensive on record. Corn rootworms, *Diabrotica* spp., caused more damage to corn than in several years in Nebraska. Over 61,500 acres were treated for *Diabrotica longicornis* (Say) in Minnesota. Hessian fly, *Phytophaga destructor* (Say), flared up on opposite sides of the country during the year. The most serious outbreak in 30 years occurred in the Willamette Valley of Oregon, causing an estimated $500,000 loss. Many farmers in South Carolina had almost complete loss of wheat yield, and damage in Georgia was evaluated at light to heavy.

Potato leafhopper, *Empoasca fabae* (Harr.), caused greater reduction of yield and quality of alfalfa in Wisconsin than any other insect in 1957. Losses of alfalfa in Illinois and Ohio were estimated at $4,500,000 and $9,750,000 respectively. Thirty to 50 percent of second-crop alfalfa could have been profitably treated in the southern half of the former state. Nebraska and Missouri also had unusually serious outbreaks with severe yellowing and "hopperburn" in many fields. High populations in Missouri ranged from 70 to 420 per sweep. Several Atlantic States received heavy to above normal infestations. Webworms, *Loxostege* spp., were heaviest since 1954 in Kansas. Most of the second-cutting alfalfa, equalling an estimated 143,000 tons, was destroyed. Injurious populations, up to 50 larvae per ten sweeps, also occurred in Illinois, Oklahoma and Missouri. Meadow spittlebug, *Philaenus leucophtalmus* (L.), was seriously abundant on alfalfa in many areas of Indiana with as many as four to six nymphs per stem. The pest was also very abundant in northern Illinois and Ohio. In Ohio it caused an estimated $5,400,000 loss. Fall adult surveys show severe to very severe populations in northern Illinois and the highest levels in six years in Ohio. Pea aphid, *Macrosiphum pisi* (Harris), was not a problem on alfalfa in eastern areas in 1957 but was abundant in Western States. Lygus bugs, *Lygus* spp., were very abundant and destructive in legumes in many areas, especially in the Western States. Louisiana and Oklahoma had as many as ten specimens of *L. lineolaris* (P. de B.) per sweep.

Following three years of devastating outbreaks, which culminated in an overall $42,000,000 loss of alfalfa in 1956, the spotted alfalfa aphid, *Theorioaphis maculata* (Buckton), was comparatively light in 1957. However, heavy damage still occurred in some states. For example, in California it was estimated the pest was responsible for damage and control costs of $9,000,000, and Utah and Nevada had estimated losses of $165,000 and $432,000 respectively. Spread of the aphid continued into new areas of infested states and Ohio reported its presence for the first time. Alfalfa weevil, *Hypera postica* (Gyll.), was the major alfalfa pest in many areas where it occurs. Severe damage to unsprayed alfalfa was reported from both eastern and western United States. Infestations were worst in years in Wyoming, with as many as 72 larvae recorded per ten sweeps. Losses on alfalfa were estimated at $200,000 in Utah and $756,000 in Nevada.

In the East, where the pest was reported for the first time in 1952, spread continued to the north and south, infestations being discovered in Connecticut, Massachusetts and South Carolina for the first time. Value of weevil control in Virginia in 1957 was estimated at over $2,000,000.

Mexican bean beetle, *Epilachna varivestis* Muls., was unusually heavy and damaging to soybeans in South Carolina and serious on this crop in areas of Alabama and Georgia. Velvetbean caterpillar, *Anticarsia gemmatalis* Hbn., extended its range of damage farther north than previously recorded. In Delaware, where infestations were reported for the first time, the insect appeared on soybeans in September. Also for the first time, Maryland and Virginia suffered from heavy damage to this crop. Southward, infestations were general on soybeans and peanuts in eastern North Carolina, heavy on soybeans in Louisiana and South Carolina, and serious on late peanuts in Georgia. In Alabama the pest was responsible for an estimated $396,750 loss of peanuts and soybeans. Green cloverworm, *Plathypena scabra* (F.), appeared in unusually heavy infestations in some of the North Central States in late summer. Minnesota, which had its first damaging populations since 1945, recorded instances of complete defoliation on soybeans and seedling alfalfa. Outbreaks of six-spotted leafhopper, *Macrosteles fascifrons* (Stal), occurred from Colorado across to Michigan. Aster yellows virus transmitted by this insect was extremely severe on many crops, particularly flax in the Dakotas and Minnesota. Loss of this crop in South Dakota was evaluated at 343,980 bushels or $1,011,301. Loss estimates in Minnesota ranged from 10 to 80 percent and resulted in the lowest yield since 1936. Up to 50 percent of the plants were infected in North Dakota, a record-breaking incidence.

Among harvester ants, *Pogonomyrmex occidentalis* (Cress.) was the major pest of cattle rangeland in Nevada. *P. barbatus fuscatus* (Em.) and *P. occidentalis* were extremely numerous in New Mexico in 1957 and caused severe damage to rangeland in many areas. *P. barbatus* v. *molefaciens* (Buckl.) continued to cause damage over most of Texas.

Many pests were of particular concern on cereal and forage crops in only one state or area during the year. Some of these may be mentioned. Sugar cane borer, *Diatraea saccharalis* (F.), was the most damaging pest on sugar cane in Louisiana, causing loss estimated at $ 7,500,000. Wheat stem sawfly, *Cephus cinctus* Nort., was responsible for the loss of an estimated 1,682,030 bushels of grain in North Dakota during the year. As many as 50 percent of the stems were infested in some counties. Sorghum webworm, *Celama sorghiella* (Riley), with populations up to 15 per head, caused heavy damage to grain sorghum over most of Texas. Corn leaf aphid, *Rhopalosiphum maidis* (Fitch), was very abundant in some areas of Ohio, causing an estimated loss of $ 4,000,000. Variegated cutworm, *Peridroma margaritosa* (Haw.), was heavy, 6 to 8 per square foot, on legumes in all areas of Oklahoma during May. An aphid, *Asiphonella dactylonii* (Theobald), was collected on Bermuda grass in New Mexico. This is a new report for the United States. Rednecked peanutworm, *Stegasta basqueella* (Chamb.), was of economic importance in peanuts in Oklahoma for the first time during the year.

Fruit Insects

Probably the most noteworthy event in insect control in 1957 was the continued successful progress toward eradication of the Mediterranean fruit fly, *Ceratitis capitata* (Wied.), in Florida. From April 1956, when the fly was first found in Miami, to the end of December 1957, an aggregate of 6,782,973 acres had been sprayed in 28 infested counties in Florida. At the end of 1957 spraying was being required on only 4,600 acres, all in Manatee County, where the last fly was taken 26 November. In December 1957 it was reported that almost 24,000 traps were in use in this state to detect possible recurrences or new infestations.

Peach twig borer, *Anarsia lineatella* Zell., on deciduous fruit and almonds, was one of the most important insects of the year in California. Extensive damage continued on peach trees in north central Washington and central Texas. Apparently because of resistance to control measures, red-banded leaf roller, *Argyrotaenia velutinana* (Wlk.), was heavier than usual in Maryland and Virginia. The pest was unusually troublesome

late in the season in New Hampshire. Apple aphid, *Aphis pomi* Deg., was more abundant than usual in Ohio and severe infestations built up in Idaho and Montana. In general, orchard mite populations were above normal in some Western States. They caused over $ 2,000,000 loss on fruit in five San Joaquin Valley counties of California. *Tetranychus telarius* (L.) was one of the main causes of loss on apple in Colorado. *T. mcdanieli* McG was highly injurious to apple and cherry in northern Utah. High populations of European red mite, *Panonychus ulmi* (Koch), built up in many states. Some of the most seriously affected were Connecticut, Indiana and Ohio.

Pear psylla, *Psylla pyricola* Foerst., was more of a problem in the Yakima and Wenatchee areas of Washington than ever before and was heavier than normal in Oregon. The insect appeared in new counties of California during the year. Brood XIV of periodical cicada, *Magicicada septendecim* (L.), produced severe damage from oviposition punctures in orchards in areas of Pennsylvania, Virginia, Maryland, Indiana and North Carolina.

Codling moth, *Carpocapsa pomonella* (L.), caused heavier damage in Maryland, New Jersey and Kansas than in 1956. Infestations were light to heavy in deciduous fruits and walnuts in southern California. Cost of control for this insect amounted to $1,300,000 in Washington. Loss in Ohio was estimated at $ 700,000. Infestations of pear-slug, *Caliroa cerasi* (L.), were the most extensive in several years on pear and cherry in western Washington and seriously damaged these crops in Nevada and southwestern Idaho.

San Jose scale, *Aspidiotus perniciosus* Comst., continued to increase in Connecticut, Oregon and New Mexico. High populations of apple maggot, *Rhagoletis pomonella* (Walsh), continued for the third year in Connecticut. Populations were very heavy on unsprayed orchards in New Jersey and Pennsylvania. Oriental fruit moth, *Grapholitha molesta* (Busck), caused more damage to peaches than in recent years in Virginia and were heavier in the previous three years in southern Idaho.

Citrus red mite, *Panonychus citri* (McG.), reached its peak during June in Florida, then declined well below the average of the preceding year. Loss of crop was valued at approximately $12,000,000. In southern California several treatments were required to control this species. Damage and control cost amounted to nearly $ 3,000,000 in this area. Heavy populations of citrus rust mite, *Phyllocoptruta oleivora* (Ashm.), caused an estimated loss in Florida citrus of about $ 6,000,000. It was more numerous than for the past five years in San Diego County, California. Fall webworm, *Hyphantria cunea* (Drury), and walnut caterpillar, *Datana integerrima* G. & R., caused heavy defoliation on pecan in the Southeastern States.

The following pests were problems in some areas: Walnut aphid, *Chromaphis juglandicola* (Kltb.), required extensive treatments in walnut orchards in Ventura County, California. Florida red scale, *Chrysomphalus aonidum* (L.), and purple scale, *Lepidosaphes beckii* (Newm.), caused approximately $18,000,000 loss of Florida citrus. Peach tree borer, *Sanninoidea exitiosa* (Say), remained the number one problem of peaches in Georgia. Rosy apple aphid, *Anuraphis roseus* Baker, was exceedingly abundant in southwest Idaho, even where controls were applied. Filbert worm, *Melissopus latiferraneus* (Wlshm.), infested as many as 30 percent of nuts in some filbert orchards in Oregon. Apple and thorn skeletonizer, *Anthophila pariana* (Clerck), was more abundant than it had been in years in western Washington, causing severe damage to apple trees.

Truck Crop Insects

As mentioned previously, the six-spotted leafhopper, *Macrosteles facifrons*, occurred in widespread outbreaks in 1957, particularly in the north central area. Serious damage from aster yellows, transmitted by this insect, was recorded on many truck crops including lettuce, potatoes, celery and carrots. Losses were greater than in the past decade in Wisconsin, where a large acreage of lettuce was abandoned. The worst outbreak in years of potato leafhopper, *Empoasca fabae*, occurred on potatoes in eastern Virginia and populations were more abundant than normal on beans and potatoes in Delaware and Maryland. Destructive infestations also occurred in potatoes in central and eastern Nebraska, Iowa, Wisconsin and Michigan. " Hopperburn " was

the most severe in years in Wisconsin and severe in Nebraska.

Heavy infestations of potato psyllid, *Paratrioza cockerelli* (Sulc), caused serious damage in potato areas in Colorado and western Nebraska. The insect caused much damage in potatoes in Wyoming in spite of controls. Overwintering populations in Texas were the heaviest since 1946. The pest was found on tomatoes in four southwest Kansas counties. As far as is known, this is a new record for Kansas. Potato flea beetle, *Epitrix cucumeris* (Harr.), because of resistance to DDT, was a serious problem in most areas of Wisconsin.

Colorado potato beetle, *Leptinotarsa decemlineata* (Say), required three control treatments in some Idaho areas. Populations were also unusually serious in Rhode Island and eastern Viriginia. Pepper weevil, *Anthonomus eugenii* Cano, was reported in New Jersey for the first time during 1957. Several fields of 40 to 50 acres were almost destroyed in the Vineland area. It is not known whether the insect will survive the winter under field conditions as far north as New Jersey.

The unusually heavy infestations of Mexican bean beetle, *Epilachna varivestis* Muls., in several Southeastern States were of particular interest in 1957. More damage to beans than had been experienced in several years was reported from Georgia and southern Alabama. Serious defoliation also occurred in beans in South Carolina and Virginia. Widespread control measures were required in Maryland and Colorado. Cabbage looper, *Trichoplusia ni* (Hbn.), was the most damaging pest of cole crops in Louisiana in 1957 and populations of 2 to 3 per plant caused extensive loss on untreated crucifers in coastal South Carolina. Abundant populations were also recorded in several other Atlantic Coastal States. Southern California had heavy infestations on lettuce, beans and cole crops. Lettuce was damaged in New Mexico and Idaho.

Hornworms, *Protoparce* spp., were above normal on tomatoes in Maryland and Delaware and caused heavy damage in eastern Viriginia. Tomato fruitworm, *Heliothis zea* (Boddie), caused considerable damage to the tomato crop in several areas. Several California counties reported light to heavy infestations on truck crops. Control and damage cost in this state amounted to almost $ 16,000,000. This insect was also responsible for serious damage to vegetable crops in Maryland, South Carolina and Virginia.

Pea aphid, *Macrosiphum pisi* (Harris), was extremely abundant, up to 60 per terminal, in pea and lentil fields in Idaho during the spring. Losses from this continued infestation were estimated at over $ 500,000 on 75,000 acres of peas. Infestations in Washington required the greatest amount of treatment in Walla Walla and Palouse areas since 1954. Cabbage aphid, *Brevicoryne brassicae* (L.), was heavier than normal on crucifers in Maryland and New Jersey and caused almost $ 300,000 damage in four California counties. Pickeworm, *Diaphania nitidalis* (Stoll), was more numerous than usual in Delaware, and infestation reached 100 percent in unprotected fall cucurbits in coastal South Carolina. Southern armyworm, *Prodenia eridania* Cram., was numerous and injurious to tomatoes and sweet potatoes in Mississippi and Louisiana, defoliating untreated sweet potato plants in many fields.

Onion maggot, *Hylemya antiqua* (Meig.) severely reduced onion bulb and seed production in Idaho. Losses in Malheur County, Oregon, ran about 15 percent. Infestations were over 90 percent in some fields in Wisconsin, where heavy loss occurred even in treated fields. Damage was also heavy in Michigan, despite controls. Spider mites, mostly *Tetranychus telarius* (L.), became severe on truck crops in eastern Virginia, and *T. atlanticus* McG. was heavier than usual on lima beans in Delaware, causing early defoliation. *T. telarius* was particularly heavy on potatoes in the Quincy, Washington, area, requiring controls in many fields.

Curly top virus transmitted by beet leafhopper, *Circulifer tenellus* (Baker), was light in Nevada, Utah and Colorado but damage from the disease to beans in south central Idaho was estimated at over $ 500,000. Entire fields were plowed under in this area. Infestations were unusually abundant and destructive in southeastern Washington areas. Populations of beet webworm, *Loxostege sticticalis* (L.), were high in most beet fields in Nebraska, with counts reaching 80 to 400 per 100 sweeps in August. The infestation in North Dakota was the first of any consequence since 1950. European corn borer, *Pyrausta nubilalis*, damaged peppers seriously

in Maryland and Delaware, with as much as 15 percent of the fruits infested.

Tobacco Insects

Hornworms, *Protoparce* spp., were more troublesome on tobacco in North Carolina than had been reported in several years. Tobacco flea beetle, *Epitrix hirtipennis* (Melsh.), was the most important insect in tobacco in South Carolina in 1957. Stink bugs were more severe than in past years in South Carolina and light to heavy in Georgia. Budworms, *Heliothis* spp., and green peach aphid, *Myzus persicae* (Sulz.), were unusually heavy in Maryland and required controls.

Cotton Insects

Boll weevil (*Anthonomus grandis* Boh.) attacks were heavy in many cotton-growing states. Some fields in Georgia had up to 85 percent punctured squares and damage was heavier in South Carolina than in 1956. Infestations in untreated cotton reached over 50 percent in early August in North Carolina. Populations were heavy and general over the southern two thirds of Mississippi by mid-July and counts were high early in the season in Alabama, where damage was estimated at $ 12,000,000. Arkansas recorded its heaviest infestations in many years, over 30 percent, late in the season, apparently due to late cotton and rains. Although infestations were erratic in Louisiana, the weevil was still the number one cotton pest. Populations were serious late in the season in Tennessee, and damage occurred farther north in this state than it had for many years. Infestations were generally light in Oklahoma and were kept under control in most Texas areas.

Cotton suffered heavily in areas of California from bollworms (*Heliothis* spp. *et al.*). The pests were abundant in late summer in Arizona and more numerous than in 1956 in Nevada. Serious infestations developed in coastal and central areas of Texas by mid-July. Some other states had medium to heavy populations.

Pink bollworm, *Pectinophora gossypiella* (Saund.), was generally light in most infested states but infestations were higher than in recent years in Graham and Greenlee Counties, Arizona. About 200 acres were slightly to severely infested in Dona Ana County, New Mexico, and in the lower Rio Grande Valley of Texas populations in some fields were as large as in 1952, an outbreak year. Spider mites required extensive controls in Kings County, California, and were light to heavy in some other areas of this state. Twice as much acreage was treated for *Tetranychus* spp. as in 1956.

Cotton leaf perforator, *Bucculatrix thurberiella* Busck, was one of the top pests in Imperial County, California, where it caused damage estimated at $1,834,887. Cotton leafworm, *Alabama argillacea* (Hbn.), appeared unusually early in many areas in 1957. It was one of the most troublesome pests of cotton in Oklahoma, developing heavy infestations by mid-August. Many untreated fields in Louisiana were completely defoliated. Severe damage was reported from parts of New Mexico and areas of Arizona. Defoliation in Georgia and South Carolina was heavy but came late in the season and was, therefore, considered beneficial.

Heaviest infestations of cabbage looper, *Trichoplusia ni*, on record appeared in cotton in Louisiana during the year, and Alabama reported the first important defoliation from this pest. Injurious population also appeared in other cotton-growing areas. Difficulty in control was reported from Louisiana and Oklahoma. Aphids were more damaging than customary early in the season in Arizona. *Aphis medicaginis* Koch caused losses in many fields in New Mexico. *A. gossypii* Glov. was heavier than in 1956 in Georgia, Alabama and Arkansas. About one half of the fields had economic infestations by 10 August in the latter state.

Lygus bugs, mainly *Lygus hesperus* Knight, were the most considerable in Arizona and required control in most fields. *Lygus* spp. were heavy in the Imperial Valley of California, causing an estimated $1,500,000 loss. Light to severe infestations also occurred in other California areas. *L. elisus* Van D. and *L. hesperus* were extremely damaging to cotton early in the season in New Mexico.

Cotton fleahopper, *Psallus seriatus* (Reut.), was very detrimental to cotton in New Mexico and, together with another fleahopper, *Spanogonicus albofasciatus* (Reut.), it was abundant in Arizona. An average of 300 nymphs

per 100 terminals was common in southern Texas early in the season.

Stored Product Insects

The khapra beetle (*Trogoderma granarium* Everts) eradication program continued to progress during the year. Between November 1953, when the destructive grain pest was found in the United States, and the end of 1957, more than 98,000 inspections were made in 44 states and 504 sites were found infested in three states: California, Arizona and New Mexico. Of the 504 sites 475, involving a volume of 125,402,064 cubic feet, had been treated by 31 December 1957.

Saw-toothed grain beetle, *Oryzaephilus surinamensis* (L.), was common and occasionally abundant in Idaho and scattered outbreaks were found in stored grain throughout Washington. This species continued to be the principal pest of stored grains in Arkansas. There was an increase in dermestids in Kansas, *Trogoderma glabrum* being the dominant species. Angoumois grain moth, *Sitotroga cerealella* (Oliv.), was heavier than normal in stored grains in Maryland and very abundant in southern Nebraska.

Rice weevil, *Sitophilus oryza* L., was the most important stored grain pest in Nebraska from the standpoint of damage and the most important insect on stored corn in South Carolina. The species is expected to cause $4,200,000 damage to 1957 grain in storage in Alabama. A grain moth, *Haplotinea ditella* (P. & M.) was reported from Idaho in 1957. This is apparently a new record for the United States.

Insects Affecting Man and Animals

Screw worm, *Callitroga hominivorax* (Cqrl.), was generally more severe than it had been for several years, in Florida, Alabama and Texas. Almost all calves were treated at birth in Florida. The widespread infestations in Alabama caused an estimated $351,180 loss and was responsible for treatment of 204,000 animals. The attack in Texas was heavy and statewide. Georgia also had a general infestation. The mild winter is believed to have contributed to the severe occurrence. Buildup did not occur until late in Oklahoma but the over-all situation was worse than in 1956. There were severe attacks on sheep and cattle in some New Mexico counties. Farther north, Kansas had the most serious and widespread infestations than in several previous years. South Dakota and Nebraska reported trouble of a local nature. The preliminary planning for a campaign to eradicate this pest from the Southeast, through the aerial release of sterile male flies, began during the year. The flies are sterilized by exposing pupae to radiation.

House fly, *Musca domestica* L., was more troublesome than in 1956 in Delaware, Nevada and Texas. The pest was especially annoying in the fall in South Dakota and a constant nuisance in areas of Nebraska.

Cattle grub (*Hypoderma* spp.) populations occurred or were contained at about normal levels in most areas but *H. lineatum* (De Vill.) was more abundant and damaging than usual in West Virginia. Loss to cattle from the pests in Wyoming was estimated at $2,000,000. Cattle lice were abundant in untreated herds in Maryland, Oklahoma, South Dakota, Nebraska and Idaho. *Bovicola bovis* (L.) was involved in many instances. Southern cattle tick, *Boophilus annulatus microplus* (Can.), was discovered on a ranch in southern Okeechobee County, Florida, in April. It was subsequently found on three other Okeechobee ranches and one in Dade County. Regular inspections and treatment of cattle and horses were initiated. The last outbreak in this area was in 1945.

Stable fly, *Stomoxys calcitrans* (L.), was much heavier than in 1956 in Nebraska and Kansas, creating a serious problem to livestock in some areas.

Mosquitoes were more abundant and troublesome than they had been for years in several states including Wyoming, Nevada, Illinois and Nebraska. Heavy rains led to the serious outbreak in Nebraska and the severe widespread populations in Texas, Minnesota and eastern North Dakota. *Aedes vexans* (Meig.), *A. dorsalis* (Meig.) and *Culex tarsalis* (Coq.) were the dominant species in Nebraska. *Aedes vexans* was the major species in North Dakota. *Psorophora* sp. and *A. sollicitans* (Wlk.) were very abundant in Louisiana and seriously disturbed farm workers in some areas. The latter species and *A. taeniorhynchus* Wied. were also very

abundant and annoying in Maryland in late summer. The pests caused drop in milk production in Colorado and were a threat to milk and beef production in west central Minnesota. Some Eastern States reported less than normal trouble. One of the most severe pests of cattle in North Dakota during 1957 was the horn fly, *Siphona irritans* (L.), which was also a considerable problem in areas of Maryland, Florida, Nebraska and New Mexico. Infestations were much higher than in 1956 in Kansas and caused great harassment to livestock. A buildup in central Oklahoma reached 2,000 to 20,000 per head.

An imported fire ant (*Solenopsis saevissima V. richteri* Forel) eradication program was initiated in infested states by federal, state and local governments in 1957. This pest, which was introduced into the United States around 1920, has been recorded on approximately 20 million acres in nine Southeastern States. In heavily infested areas, such as southern counties of Alabama, Mississippi and Louisiana, it is regarded as a serious pest of young animals and an annoying and injurious attacker of man. The mounds are hazardous to the operation of farm machinery and the pest feeds upon a variety of crops.

Pests and Diseases of Date Palm in Libya

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THE cultivation of date palm is widespread in Libya, contributing substantially to the food supply of a large sector of the population. The principal groves are scattered along the coast or situated in the oases inland. Several insects, mites and fungus diseases often cause severe damage, the parlatoria date scale and mites being the most important in the plantations. In storage, dried dates are also often attacked by insect pests.

Scale Insects

PARLATORIA DATE SCALE, *Parlatoria blanchardi* (Targ.). This widely distributed scale has been observed in all palm groves in Libya. In the coastal area, it is usually of little importance, as attacks are sporadic, sometimes severe but always localized. Damages due to this insect, however, have been noted at Zavia, Zanzur, Tripoli, Zliten, Misurata and Sirte in Tripolitania, and at Agedabia, Tocra, Derna and Tobruk in Cyrenaica.

In the oases inland, this pest finds optimum conditions for its development. It occurs in great abundance in the oases of Jalo in Cyrenaica, Hon, Brak, Sebha, Murzuch and Gat in the Fezzan, and also at Gadàmes in Tripolitania. Hot and moist climate, such as prevails in the Brak oasis, is obviously more favorable to the development of the insect than the drier climate at Murzuch. Palms that are too closely planted or poorly attended seem to be more liable to attack. It appears that varieties of date palms may also differ in their susceptibility. For instance, at Hon the varieties Deglet Nur and Kadrai were found to be decidedly more heavily infested than other local varieties.

In the coastal areas, the scale lives almost exclusively on the leaf and occurs on dates

[1] The writer is grateful to the Director of the Commonwealth Institute of Entomology for the identification of the following insects and mites: *Batrachedra amydraula, Eutetranychus banski, Oligonychus afrasiaticus, Ephestia cautella* and *E. calidella.*

only exceptionally. In the oases inland, on the other hand, dates are often very severely attacked and completely covered by the scale.

Predators have been reported in the inland oases, such as *Cybocephalus palmarum* Peyerh, which occurs in the Fezzan. The occurrence of such predatory insects, however, did not greatly reduce the damage caused by the parlatoria date scale.

In some special cases, it may be feasible to apply chemicals for the control of this scale. In order to determine the effectiveness of some commonly used insecticides, experiments were carried out at Hon in 1957. In the first experiment the chemicals were applied on 10 April 1957 by a power-operated sprayer mounted on a wheelbarrow and fitted with a rubber tubing of the necessary length. The operator holding the spray gun climbed up the palm trunk and sprayed the foliage thoroughly from near the top of the tree.

The results of the first experiment, which are given in Table 1, indicate that both parathion and diazinon at the concentration used gave satisfactory control of the scale and that the addittion of white oil did not increase the potency of these chemicals. Parathion, however, has a disadvantage, in that owing to its high toxicity, the operator has to wear a mask which is unpleasant in the desert climate. Parathion and other highly toxic chemicals are therefore not recommended for use in this type of treatment in Libya.

Two other experiments were designed to test the effectiveness of white oil alone for the control of the scale and the value of a wetting agent in diazinon treatment. A 2.5 percent white oil spray was applied on 16 April 1957 and it was found that on the treated palms, 48 percent of the scale insects were dead on 10 May, in comparison with 15 percent mortality of the insects on the untreated trees. This appears to confirm the previous result that white oil is probably not effective by itself against the parlatoria date scale. Diazinon emulsion at a concentration of 0.05 percent active ingredient with 0.05 percent wetting agent added was applied on 9 May and after four days the mortality of insects on treated trees was 95 percent, and after eight days 99 percent. It seems to indicate that the addition of a wetting agent may be desirable.

RED DATE SCALE, *Phoenicococcus marlatti* Ckll. Nearly all species of palms in Libya are more or less infested by the red date scale. The insects in crusted and reddish masses are mostly found deep down on the leaf bases hidden behind the stem sheaths. In the inland oases it is much more common than on the coast, being most widespread in the Fezzan. This scale, however, does not

TABLE 1. *Results of application of insecticides for the control of the parlatoria date scale* (Parlatoria blanchardi) *of date palm in Libya.* [a]

Insecticide and concentration in active ingredient	Mortality of insects, in percent, on		
	18 April	23 April	10 May
Parathion emuls., 0.05 %	74	90	97
White oil, 2.5% + parathion emuls., 0.05%	76	91	95
Diazinon emuls., 0.05 %	84	97	96
White oil, 2.5% + Diazinon emuls., 0.05%	71	92	87
Malathion emuls., 0.05 %	49	60	59
White oil, 2.5 % + malathion emuls., 0.05 %	51	81	50
Check A	6	—	8
Check B	12	—	—

[a] Insecticides were applied on 10 April 1957.

appear to be very harmful and its economic importance is probably negligible.

OTHER SCALE INSECTS. A mealy bug, *Pseudaspidoproctus hyphaeniacus* Hall., was found, always in small numbers, on petioles and leaf bases in the oases of Hon, Sebha, Brak and Ubari in the Fezzan. It has very little economic significance. Cottony cushion scale, *Icerya purchasi* Mask., was observed once on dates in Latrun on the Cyrenaica coast, where oleander scale, *Aspidiotus hederae* (Vallot), was also noticed on dates.

Pests of Dates on Palms

LESSER DATE MOTH, *Batrachedra amydraula* Meyr. Lesser date moth appears to have several generations each year, as injury caused by its larvae has been observed on dates shortly after the setting of young fruit in April to May, again in July, and then just before harvest in September. It is presumed that all the larvae observed belong to the same species but only those found on dates in September in Fezzan developed normally in the laboratory.

On the coast, infestation is light. In Fezzan, on the other hand, damage is much more severe, especially in the cases of Brak and Sebha.

DATE STONE BEETLE, *Coccotrypes dactyliperda F.* The larva of this small beetle develops in the seed; the female tunnels through the pulp to the stone on which it lays eggs. Infested fruits usually rot and fall to the ground.

This beetle has only been seen in the coastal oases at Zanzur, Tripoli, Tagiura in Tripolitania, and Latrun, Ras el Hilal in Cyrenaica. Egg laying, larvae and young adults were observed from the end of July to the beginning of October.

DRIED FRUIT BEETLE, *Carpophilus hemipterus* (L.). This beetle, usually considered as a minor pest attacking stored dates, is attracted by the injured or overripe variety. It was observed not only on dates fallen to the ground but also on those remaining on growing palms. It was even found to infest apparently sound fruit but only shortly before or when the dates are ripening.

Results of examining dates picked from palms in the oasis near Tripoli from the end of July to the end of September 1957 (Table 2) show that infestations by all the three insects mentioned above were low. Dried fruit beetle appeared only late in the season shortly before or during the harvest.

MITES. Damage caused by mites has not been observed in the coastal oases. Only once in August 1955, a few species of *Eutetranychus banksi* McGr. (*Anychus latus* (Can) Sayed; *A. orientalis* (Zacher) (Klein) were found on dates at Sidi Kalifa on the Cyrenaica coast.

The date palms in inland oases, on the contrary, are heavily attacked by *Oligonychus afrasiaticus* McGr. which spins fine webs on dates and pedicels. As the webs hold the exuviae of nymphs as well as dust and sand particles, the dates are covered by a grayish coating. The period of infestation extends from June to the beginning of October. The most severe damage has been reported in the oases of Gàadmes in Tripolitania, Hon, Brak, Sebha and Gat in the Fezzan, and Jalo in Cyrenaica. Infestation, however, is not widespread. Palms under shelter or poorly

TABLE 2. *Extent of infestation of dates on palms by three insects near Tripoli, 1957.*

Time of examination	Number of fruit examined	Percent fruit infested by		
		Batrachedra amydraula	*Coccotrypes dactyliperda*	*Carpophilus hemipterus*
End July	600	1.2	2,0	—
Mid-August	1500	0.5	1.6	—
End September	1000	0.7	3.8	0.4

tended are usually more heavily infested than vigorous palms growing in the open.

Pests of Dates in Storage

In the coastal region, dates are usually kept pressed in baskets or jars, with or without stones removed. In the inland oases, soft varieties are stored pressed, whereas varieties which are less juicy and with a tough skin are stored in bulk inside the house or buried in the sand.

Pressed dates and dates stored in bulk are often severely infested by insects, but those kept in the sand are much less liable to infestation and often remain sound for a year or more.

The following insects have been observed to infest dates in storage:

Plodia interpunctella Hübn.
Ephestia cautella (Wlk.)
E. calidella Guen.
Oryzaephilus surinamensis (L.)
Tribolium confusum Duv.
Carpophilus hemipterus (L.)

Date Diseases

Graphiola leaf spot caused by *G. phoenicis* Poit. was found in all the palm groves on the coast from Zuara in Tripolitania to Tobruk in Cyrenaica but it has never been seen in the oases inland. The older, lower leaves appear to be attacked first. Palms which are neglected or poorly tended are infested more heavily.

The Khamedj disease caused by *Mauginiella scaettae* Cav., which affects the inflorescence of date palms, is localized chiefly in the oases of Jalo in Cyrenaica and Hon in the Giofra, where the climate is intermediate between that of the coastal region and the typically desert areas. On the coast and in the Fezzan in the areas of Brak, Sebha, Murzuch and Gat, the damage seems to be less serious. The disease occurs in March to April, before the inflorescence emerges from the spathe. In severe cases, the entire inflorescence is destroyed and converted into a brownish mass. When the attack is slight, only some of the floral buds are destroyed and fall, whereas those remaining at the base of the inflorescence develop normally.

Outbreaks and New Records

India

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An Eriophyid Mite as a New Pest of Garlic in Mysore

GARLIC (*Allium sativum*) is an important spice crop possessing also valuable medicinal properties. It is grown throughout India under irrigation and it takes about five months to mature.

Garlic is generally known to be attacked by a thrips, *Thrips tabaci* L., which is sometimes very serious and responsible for considerable loss of the crop in India. Recently, another pest, an eriophyid mite, was noticed to infest the garlic crop in some fields in Kolar District (Mysore). Infested plants showed a stunted growth. The affected leaves had pale yellowish margins, and the yellowing in some cases spread to other portions of the leaf. The most characteristic symptom was that the tips of some leaves, particularly the younger ones, never unfurled normally and remained within the next older leaves, giving them an arched appearance (Figure 1). Even the size of underground bulbs is reduced.

The adult mite is elongate, cylindrical, slightly broader at the anterior end and gradually tapering to the posterior end; whitish in color; with two pairs of legs in the front end and a few scattered hairs on the body. It measures from 0.21 to 0.23 millimeter in length and 0.05 to 0.06 millimeter in width. The young ones are of the same color and shape, being different only in size. Eggs are slightly ovoid and transparent, measuring 0.06 by 0.008 millimeter.

The insects in all stages of development are usually found in the groove along the midrib on the upper surface of the leaf blade. As the groove along the midrib is rather deep, the mites are not easily seen unless the groove is opened.

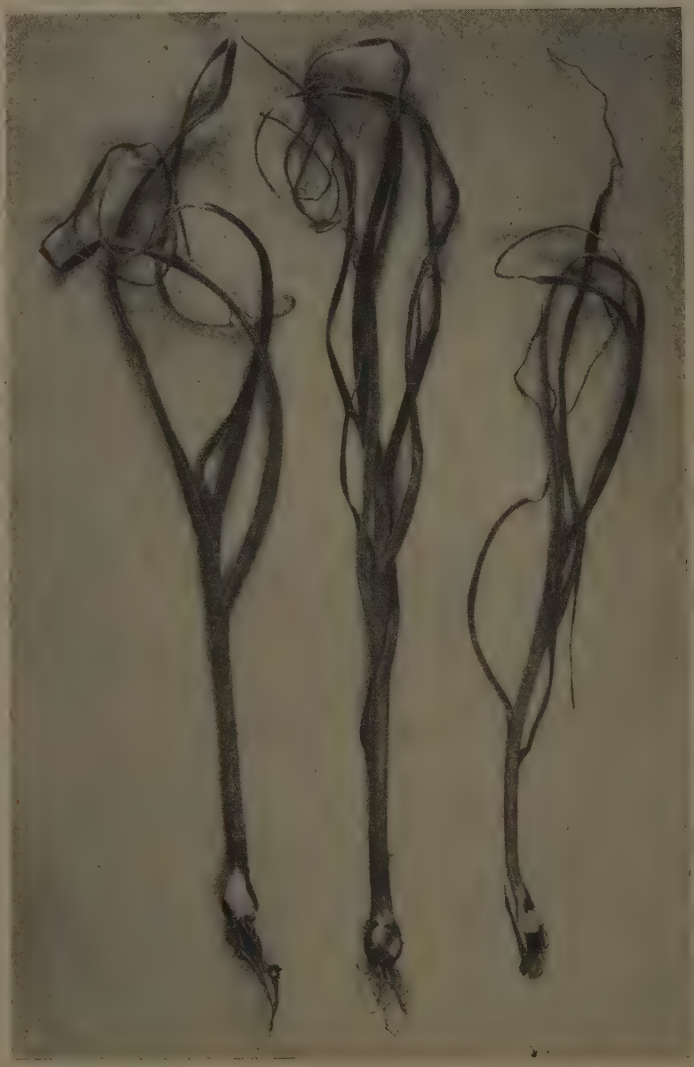

Figure 1. Garlic seedlings infested with an unidentified species of eriophyid mite in Kolar District (Mysore), India. The affected seedlings are stunted, the leaves curled and with yellowish margins.

Peru

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Further Notes on Verticillium Wilt of Potato in Peru

For many years, since preliminary studies of plant diseases in Peru were made by Abbott,[1] it was generally believed that on both the mountains and coastal plains of the country potato wilt was caused by *Fusarium oxysporum*. In 1956, *Verticillium albo-atrum* was isolated for the first time from diseased potato plants originating from the central coastal area and, in few cases, the same was true concerning an unidentified species of *Fusarium*. As previously reported,[2] the diseased plants showed two types of symptoms: those of type A were similar to those of *Verticillium* wilt of cotton, including the presence in leaves of brown intervenial spots of varying sizes, marginal necrosis and upward rolled edges, beginning with lower leaves. The affected leaves later wilted and died but mostly remained on the stem. The latter, when sectioned longitudinally, showed yellow to brown discoloration, especially in the vascular system. This discoloration was observed from the base of the stem up to the tip, extending even into the petiole. In the sectioned tubers the same discoloration could sometimes also be found. Symptoms of type B included yellowing of leaves, formation of aerial tubers, upright terminal shoots with leaves rolled upward, general wilting and premature death of the plant.

In 1957, the wilt was again prevalent in the central valleys of the coastal area but the predominant symptoms were of type A.

In order to ascertain the pathogenicity of *Verticillium albo-atrum* and *Fusarium* sp. isolated from the wilted potato plants in the central coastal area, inoculation experiments were carried out in 1957. Young potted potato plants, when reaching a height of 20 centimeters, were inoculated by mixing the soil with cultures of *V. albo-atrum* and *Fusarium* sp., either separately or in combination. Each treatment consisted of eight pots, and another set of eight noninoculated pots served as checks.

The results showed that all plants inoculated with *Verticillium albo-atrum* alone or with *V. albo-atrum* and *Fusarium* sp. in combination, were defoliated and eventually died. On the withered stems, sclerotia of *V. albo-atrum* could readily be observed and the fungus was re-isolated from affected plants. Aerial tubers, however, were not produced in any of the diseased plants.

In the pots inoculated with *Fusarium* sp. alone, it was observed that only 1 percent of the plants died and that the death was probably caused by insect attacks, as wilting was not observed. In this group, as well as in the checks, young plants grew normally to maturity.

From the experimental results mentioned above, it was obvious that *Verticillium albo-atrum* is the causal agent of the potato wilt in the central coastal area of Peru. This conclusion is further strengthened by the fact that this fungus has been isolated from all the fields in which the wilt disease occurred and from which samples had been taken. The unidentified species of *Fusarium* is probably nonpathogenic to potatoes.

Since the inoculation of potato plants with *Verticillium albo-atrum* and *Fusarium* sp., either separately or in combination, failed to induce the production of aerial tubers, it may be said that it is not a typical symptom of *Verticillium* wilt but is probably a response to excessive soil moisture, as is often observed in the case of *Fusarium* wilt of potato.

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[1] ABBOTT, E. V. 1931. Enfermedades de las plantas cultivadas en el Perú. *Estac. Exp. Agr. La Molina Circ.* 18.

[2] SEGURA, CONSUELO BAZÁN DE. 1956. Verticillium wilt of potato in Peru. *FAO Plant Prot. Bull.* 5 : 26.

Thailand

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Occurrence of Bacterial Blight of Rice

A disease causing leaf blight of rice was noticed for the first time in Thailand in September 1957 in a fertilizer experimental plot near the Agricultural Experiment Station at Bangkhen. The disease was subsequently identified as bacterial leaf blight caused by *Xanthomonas oryzae* (Uyeda & Ishiyama) Dawson. In diseased plants, linear stripes developed between larger veins of the leaf blade and sheath, appearing at first water-soaked, translucent and dark green. The stripes gradually increased in size and sometimes became yellowish or bleached blotches. Blight started usually from leaf tips. Bacterial exudate in amber color is readily found on the diseased area. At a later stage of development the tops of affected plants turned brown and could be readily observed in the field.

The outbreak of the disease in September 1957 was probably favored by various factors, such as the abnormal weather conditions prevailing during the late summer, and excessive use of nitrogen fertilizers in the experimental plot. Further outbreaks have not been observed.

Bacterial blight of rice was first described in Japan in 1922 and is now known to occur in warmer regions (Kushu-Kanto) of Japan, China, the Philippines and possibly Indonesia.

Plant Quarantine Announcements

Egypt

Order of 31 July 1957, published in the *Journal officiel du gouvernement égyptien* on 5 August 1957, specifies that *Dolichos lubia* be added to the list of vegetable seeds, the importation of which is prohibited unless an additional declaration is included in the required phytosanitary certificate, attesting freedom from virus diseases in the seed-producing crop. The other vegetable seeds, the importation of which is subject to the same requirement, are *Phaseolus* spp. (kidney bean, sieva bean and lima bean), *Glycine soya* (soybean), *Cucurbita pepo* (marrow squash) and *Lactuca sativa* (lettuce).

Peru

Supreme Resolution No. 278 of 12 December 1957, published in *El Peruano* No. 5021 on 26 December 1957, establishes the following customs points as points of entry for the importation of fruits and vegetables, whether fresh or not: Aguas Verdes, Tumbes, Tumbes post office and airport, Paita, Talara, Piura post office and airport, Pimentel, Eten, Chiclayo post office and airport, Salaverry, Chicama, Trujillo airport, Callao, Lima post office and Limatambo airport, Pisco, Matarani, Mollendo, Arequipa post office and airport, Ilo, Moquegua post office, Tacna, Tacna post office and airport, Puno, Yunguyo, Puno post office, Iquitos, Iquitos post office and airport, Puerto Maldonado, Madre de Dios post office.

In special cases, importation through other customs offices may be authorized by the Department of Agriculture.

Turkey

Law No. 6968 of 15 May 1957, published in the *Resmi Gazete* No. 9615 on 24 May 1957, authorizes the establishment of the General Directorate of Pest Control and Plant Quarantine in the Ministry of Agriculture and provides powers in the regulation of plant imports and exports, in domestic quarantine and pest control, and in the regulation of manufacturing and marketing pesticides. The provisions governing plant imports and exports are as follows:

A list enumerating plant diseases and pests and plants, the importation and transit of which are prohibited, is to be published (see *FAO Plant Prot. Bull. 6* : 94. 1958) and amended whenever necessary. All the plants must be imported or exported through declared customs posts. Each consignment destined for importation (except that weighing less than 1 kilogram and imported for planting) must be accompanied by a certificate of origin and sanitation issued by the plant protection agency of the exporting country. The importer of plants for planting or multiplication should apply in advance for a permit from the Ministry of Agriculture, and, before unloading the plants, should submit a declaration to the local plant quarantine authority. The plants, together with containers and accompanying documents, are subject to inspection on arrival and the plants, if found to carry prohibited plant diseases and pests, may be treated, destroyed or refused entry. Passengers carrying plants from a foreign country must declare them at the customs. The plant quarantine authority is authorized also to inspect all kinds of commodities from abroad which may carry plant diseases or pests. Importation of plants through letter mail is prohibited. Transit of plants is permitted only if the plants are so packed and transported as not to allow the spread of plant diseases and pests.

The new Order repeals Law No. 393 of 29 December 1923, Law No. 541 of 12 January 1925 and amendment, Law No. 858 of 26 May 1926 and amendment, Law No. 1756 of 26 February 1931 and Law No. 2906 of 29 January 1936.

United Kingdom (Northern Ireland)

The Importation of Raw Vegetables (Northern Ireland) Order, 1958, modifies for specified periods of 1958 the restrictions imposed by the Importation of Plants (Northern Ireland) Order, 1955, on the importation of certain raw vegetables from specified districts of Belgium, France, Italy and the Netherlands. The provisions are similar to those governing raw vegetables in the Importation of New Potatoes and Raw Vegetables Order, 1958, made by England and Wales (See *FAO Plant Prot. Bull. 5* : 79. 1958.)

News and Notes

International Symposium on Crop Protection

The tenth annual International Symposium on Crop Protection (*Symposium International de Phytopharmacy et de Phytiatry*) was held in Belgium, 6–7 May 1958, under the patronage of the Brussels World Exposition. It took place both at the Institute of Agronomy in Ghent and at the Exposition grounds in Brussels, and was attended by scientists from a number of European countries, as well as representatives of manufacturers of pesticides.

The symposium was opened by Prof. J. van den Brands, President of the Organizing Committee. More than 50 technical papers dealing with chemical control of various plant diseases and pests and weeds were presented. The proceedings of the symposium will be published shortly and will be obtainable from the Organizing Committee, Institut agronomique de l'Etat, Coupure Links 233, Ghent.

Plant Protection Legislation in French Overseas Territories

The plant protection legislation concerning French overseas territories consists of decrees made by the Council of Ministers of France, ministerial orders issued by the French Ministry of Overseas, general orders issued by the heads of governments of federated territories, territorial orders issued by the heads of local governments and others. The legislation made by the central authority is generally applicable to all territories, while that made by local governments is applicable to the territories concerned. In order to provide a ready reference to the nearly 400 laws and orders involved, a list of such legislation, in effect on 1 January 1957, was published in *L'Agronomie tropicale* (Vol. 12, No. 6. November-December 1957). In addition to the listing of legislation under various territories, the legislation is also indexed under different plants and other subjects. The list is obtainable from the Direction de l'agriculture, d'élevage et des forêts, Ministère de la France d'outre-mer, Paris.

Roma, 1958 — Tipografia del Senato del Dott. G. Bardi

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